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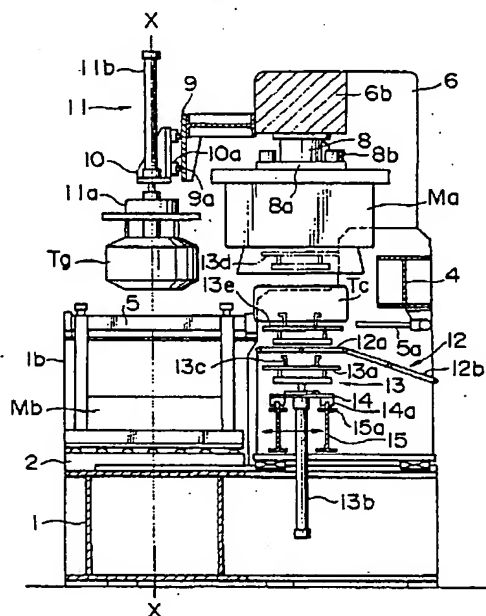
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(54) Tyre vulcanizer

(57) A tire vulcanizer in accordance with the present invention comprises a fixed base (1) on which tire vulcanization molds (M) are mounted, a movable frame (4) which can reciprocate in the longitudinal direction on the fixed base, and an elevating frame (6) attached to the movable frame so as to be raised and lowered. After the

tire vulcanization mold (M) is opened by raising the elevating frame and lifting an upper half mold (Ma) of the tire vulcanization mold, the upper half mold of the tire vulcanization mold is moved to the rear by the movable frame to carry out the removal of a vulcanized tire and the supply of a green tire.

FIG. 3



end of the fixed portion 12b so as to be capable of swinging between the horizontal position and inclined position. The central portion of the swinging portion 12a has a roller arrangement such as to pass a tire holding means 13a, mentioned later, but not to pass the vulcanized tire Tc.

Reference numeral 13 denotes a vulcanized tire Tc removing device. The vulcanized tire Tc removing device 13, including a tire holding means 13a having a holding claw 13c and a cylinder 13b for raising and lowering the tire holding means 13a, is configured as if the green tire loader 11 is attached to a movable stand 14, mentioned later, reversely in the vertical direction.

Reference numeral 15 denotes a pair of beams fixed to the fixed base 1, 15a denotes horizontal rails fixed to respective beams 15 along the transverse direction, 14a denotes direct-acting bearings engaging with respective horizontal rails 15a, and 14 denotes a movable stand fixed to the direct-acting bearings 14a. The movable stand 14 is configured so as to be capable of moving in the transverse direction.

Reference numeral 16 denotes a tire vulcanization mold M transfer device. The tire vulcanization mold M transfer device 16, including a base 16c, a movable stand 16b mounted on the base 16c so as to be capable of moving in the transverse direction, a roller guide 16a attached to the top surface of the movable stand 16b along the longitudinal direction, and a drive means (not shown), is arranged on the front side of the fixed base 1. When the tire vulcanization mold M is loaded and unloaded by using a forklift etc., this tire vulcanization mold M transfer device 16 is unnecessary. Also, the mold loading/unloading roller guides 2 can be omitted.

Next, the operation of the tire vulcanizer shown in FIGS. 1 to 3 will be described in detail.

If the tire vulcanization in the tire vulcanization mold M1 is finished, and a green tire Tg to be vulcanized in the tire vulcanization mold M1 is held by the green tire loader 11 and waits, the heating/pressurizing medium in the tire is discharged, and the connection between the upper half mold Ma and lower half mold Mb of the tire vulcanization mold M1 is severed by actuating the connection severing device 8b corresponding to the tire vulcanization mold M1.

Then, the upper half mold Ma of the tire vulcanization mold M1 is opened by actuating the cylinder 7 and raising the elevating frame 6. When the upper mold Ma is raised to a height such as not to interfere with the lower half mold Mb, the raising of the elevating frame 6 is stopped (see FIG. 2). At this time, a vulcanized tire Tc is also raised together with the upper half mold Ma. Since this operation is publicly known, the detailed explanation thereof is omitted.

Subsequently, the movable frame 4 is retreated by actuating the cylinder 5. At this time, the green tire loader 11, which holds the upper half mold Ma and the green tire Tg via the elevating frame 6, retreats. When the center of the green tire loader 11 agrees with the cen-

terline X-X of the lower half mold Mb, the retreat of the movable frame 4 is stopped (see FIG. 3). At this time, the vulcanized tire Tc removing device 13 is arranged so as to align with the center of the upper half mold Ma.

After the retreat of the movable frame 4 is stopped, the loader basket 11a is lowered to supply the green tire Tg into the empty lower half mold Mb. On the other hand, the empty loader basket 11a is raised.

During this time, the vulcanized tire Tc removing device 13 is raised while the tire holding means 13a closes the holding claw 13c. When the holding claw 13c reaches the inside of the lower bead of the vulcanized tire Tc (see the chain line 13d in FIG. 3), the raising of the tire holding means 13a is stopped. The holding claw 13c is opened to hold the vulcanized tire Tc.

Then, the holding means 13a is lowered to remove the vulcanized tire Tc from the upper half mold Ma by pulling it down out of the upper half mold Ma.

When the holding means 13a is lowered to a position indicated by the solid line 13e in FIG. 3, the holding claw 13c is closed and the holding means is further lowered. At this time, the vulcanized tire Tc is left on the swinging portion 12a of the vulcanized tire Tc delivering roller conveyor 12, and the holding means 13a passes through the swinging portion 12a, reaching the lowering limit position to stop.

Subsequently, the swinging portion 12a is inclined to deliver the vulcanized tire Tc to the outside of the tire vulcanizer by gravity via the fixed portion 12b.

After the loading and unloading operation of the tire is finished, the upper half mold Ma is advanced by reversing above procedure, and the upper half mold Ma is lowered while carrying out the shaping to close the tire vulcanization mold M1.

Then, the upper half mold Ma is connected to the lower half mold Mb, and a heating/pressuring medium for vulcanization is introduced into the tire to start the vulcanization process. At the same time, the connection between the upper half mold Ma and the elevating frame 6 is severed by using the connection severing device 8b, and the green tire loader 11 is moved to a green tire Tg supply position to receive the green tire Tg to be vulcanized next.

After that, the green tire loader 11 is moved to a position in front of the tire vulcanization mold M in which the vulcanization process is to be finished and kept waiting, and the vulcanized tire Tc removing device 13 is moved to a position at the rear of the tire vulcanization mold M in which the vulcanization process is to be finished next and kept waiting.

During the above time, the vulcanization process is continued in other tire vulcanization molds M.

In the case where the tire vulcanization mold M transfer device 16 is provided, when the change of mold, change of bladder, which is an expendable, and the cleaning of mold are performed, the lock of the lower half mold Mb to the fixed base 1 is released, and then the tire vulcanization mold M is pulled out onto the mov-

able stand 16b and moved to the mold change work position, where the necessary work is done. After the work is finished, the tire vulcanization mold M is mounted by reversing above procedure. During this time, vulcanization is continued in other tire vulcanization molds M, and the tire can be loaded and unloaded by opening the tire vulcanization mold M during the time when the mounting and demounting operation of mold is not interfered with.

(Second embodiment)

Next, a tire vulcanizer in accordance with a second embodiment of the present invention will be described with reference to FIG. 4.

FIG. 4 is a front view of the tire vulcanizer in accordance with the second embodiment. The configuration of the tire vulcanizer in accordance with the second embodiment is the same as that of the tire vulcanizer in accordance with the first embodiment except the connection severing device 8b (the connection severing device for severing the connection between the elevating frame 6 and upper mold Ma of the tire vulcanization mold M), so that only different points will be described.

Although in the first embodiment, the spacer 8 attached to the connection severing device 8b is fixed on the lower surface of the beam 6b of the elevating frame 6 corresponding to the tire vulcanization mold M, in the second embodiment a horizontal rail 6d is fixed on the lower surface of the beam 6b of the elevating frame 6 in the transverse direction, and direct-acting bearings 8c engaging with the horizontal rail 6d are fixed to the top surface of the spacer 8. To the lower flange 8a of the spacer 8 is attached the upper half mold Ma of the tire vulcanization mold M. By moving the spacer 8 in the transverse direction as indicated by the arrow in FIG. 4 by actuating a drive means (not shown), the connection severing device 8b can be used in common for a plurality of sets of tire vulcanization molds M.

In the tire vulcanizer shown in FIG. 4, after the connection severing device 8b is made in the severing state in advance, the elevating frame 6 is raised slightly once, and then the connection severing device 8b is moved, via the spacer 8, to the position of tire vulcanization mold M in which the vulcanization process is finished next, and then the elevating frame 6 is lowered. The elevating frame 6 is connected to the upper half mold Ma of the tire vulcanization mold M, and the finish of the tire vulcanization process in this tire vulcanization mold M is awaited. The subsequent operation is the same as that of the first embodiment.

Needless to say, in the second embodiment, a plurality of conventional tire vulcanization molds cannot be mounted.

Claims

1. A tire vulcanizer comprising a fixed base (1) on

which tire vulcanization molds (M) are mounted, a movable frame (4) which can reciprocate in the longitudinal direction on said fixed base, and an elevating frame (6) attached to said movable frame (4) so as to be raised and lowered, in which after the tire vulcanization mold (M) is opened by raising said elevating frame and lifting an upper half mold (Ma) of the tire vulcanization mold, the upper half mold of the tire vulcanization mold is moved to the rear by said movable frame (4) to carry out the removal of a vulcanized tire (Tc) and the supply of a green tire (Tg).

2. A tire vulcanizer according to claim (1), wherein a plurality of sets of tire vulcanization molds (M) are mounted on the fixed base (1), and a connection severing device (8b) for severing the connection between the upper half mold (Ma) and lower half mold (Mb) of the tire vulcanization mold (M) in which vulcanization process is finished is attached to said elevating frame (6) so as to correspond to each tire vulcanization mold.
3. A tire vulcanizer according to claim (1), wherein a horizontal rail (6d) is attached to said elevating frame (6) in the transverse direction, and said connection severing device (8b) is supported by said horizontal rail (6d) so as to be movable in the transverse direction.
4. A tire vulcanizer according to any one of preceding claims (1) to (3), wherein a horizontal rail (9a) is attached to said elevating frame (6) in the transverse direction, and a green tire loader (11) is supported by said horizontal rail (9a) so as to be movable in the transverse direction.
5. A tire vulcanizer comprising a fixed base (1) on which tire vulcanization molds (M) are mounted, a movable frame (4) which is reciprocable in the longitudinal direction relative to said fixed base (1) and means (5, 1a, 4c) for moving said frame (4) in the longitudinal direction, an elevatable frame (6), attached to said movable frame (4) so as to be raisable or lowerable relative thereto and means (7, 6c, 4d) for raising or lowering said elevatable frame (6), in which said tire vulcanization mold (M) is openable by raising said elevatable frame (6) which is operably attached to an upper half mold (Ma) of said tire mold (M), said upper half mold (Ma) and said frame (6) being movable rearwardly on said frame (4) by said moving means (5, 1a, 4c), means (12, 13) for the removal of a vulcanized tire (Tc), and means (10, 11) for supplying a green tire (Tg).
6. A tire vulcanizer according to any one preceding claim wherein said elevatable frame (6) comprises vertical legs (6a) substantially spanning said fixed

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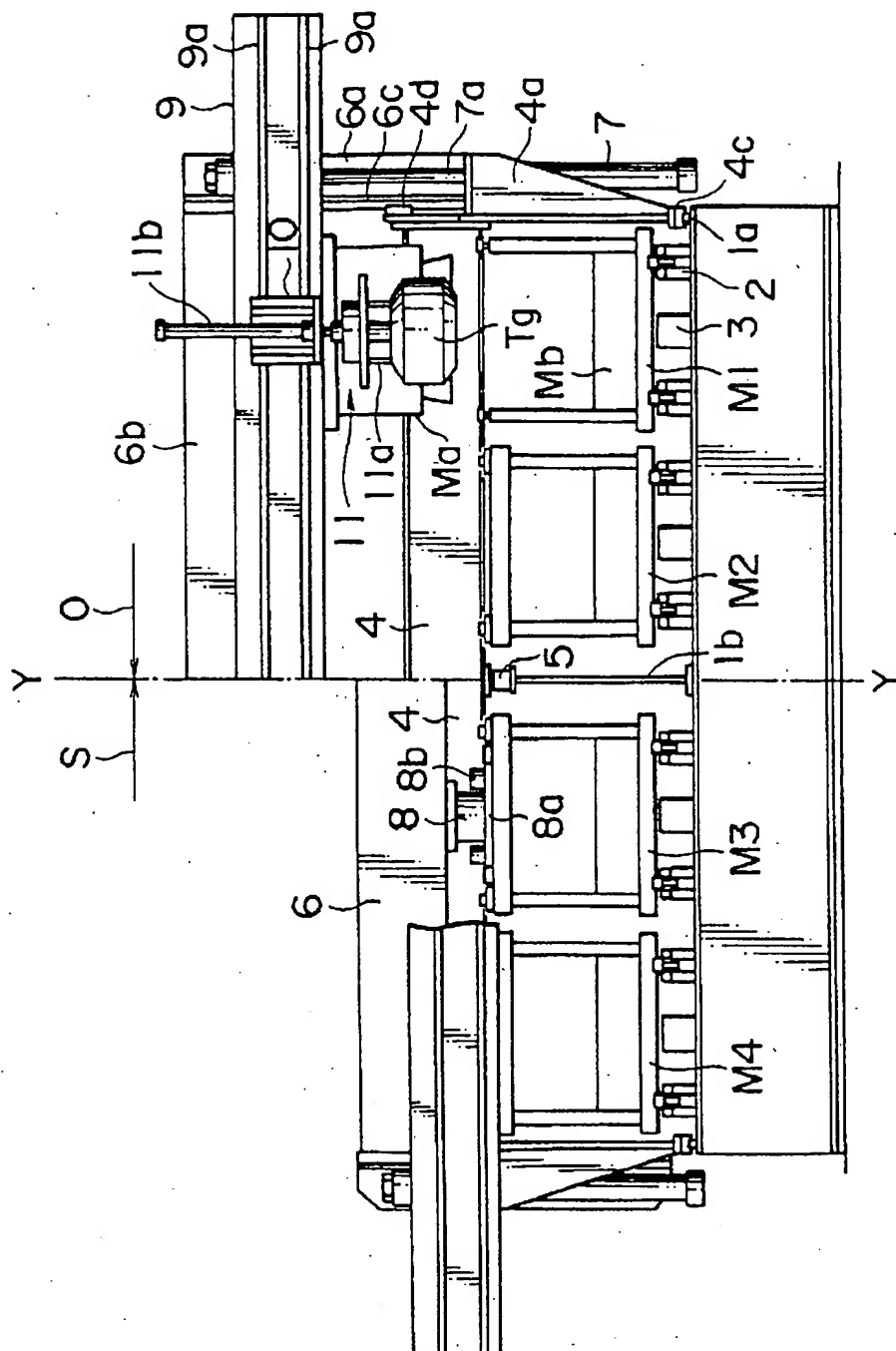


FIG. 2



FIG. 3

